Docket No.: 1309.43634X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

Kunihiko NASHIMOTO et al.

Serial No.   10/795,997

Filed: March 10, 2004

For: STORAGE CONTROL SUBSYSTEM FOR MANAGING LOGICAL
               VOLUMES

PETITION TO MAKE SPECIAL
UNDER 37 CFR §1.102(MPEP §708.02)

June 6, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants hereby petition the Commissioner to make the above-identified

application special in accordance with 37 CFR §1.102(d). Pursuant to MPEP

§708.02(VIII), Applicants state the following.

(A)   This Petition is accompanied by the fee set forth in 37 CFR

§1.17(h). The Commissioner is hereby authorized to charge any additional

payment due, or to credit any overpayment, to Deposit Account No. 50-1417.

(B) All claims are directed to a single invention. If the Office determines

that all claims are not directed to a single invention, Applicant will make an

election without traverse as a prerequisite to the grant of special status.

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(C) A pre-examination search has been conducted.

The search was directed to the invention set forth in claims 1-20. The present invention is directed, at a minimum, to a storage control subsystem that can communicably connect to a host, that includes: a disk portion that stores data sent by the host; a channel control unit that constitutes an interface with the host; a disk control unit that is connected to the disk portion and constitutes an interface with the disk portion; a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit; and control memory that stores information on the constitution of a plurality of logical volumes formed by means of disk allocation, wherein the control memory comprises: online information indicating whether a logical volume in the disk array is online; and information on the path between the online logical volume and the host to which the online logical volume is connected.

The search of the above features was conducted in the following areas: class 707, subclasses 200-204, class 709, subclass 213-216, 220 and 225, class 711, subclasses 100, 111-114, 118, 151-154 and 161-165 and class 714, subclasses 5-7.

Additionally, a computer database search was conducted on the USPTO system EAST.

(D) The following is a list of the references deemed most closely related to the subject matter encompassed by the claims:

U.S. Patent Number	Inventors
5,257,367	Goodlander et al.
5,388,243	Glider et al.
6,854,034	Kitamura et al.

U.S. Patent Publication No.	Inventor(s)
2002/0184439	Hino et al.
2003/0191917	McBrearty et al.
2003/0196056	Vishlitzky et al.
2004/0148479	Patel et al.

A copy of each of these references (as well as other references uncovered during the search) is enclosed in an accompanying IDS.

(E) It is submitted that the present invention is patentable over the references for the following reasons.

It is submitted that the cited references, whether considered alone or in combination, fail to disclose or suggest the invention as claimed. In particular, the cited references, at a minimum, fail to disclose or suggest a cache memory unit that temporarily stores data that is sent and received to and from the channel

control unit and the disk control unit, and/or online information indicating whether a logical volume in the disk array is online, and/or control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded, and/or a storage control subsystem wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of volumes are paired and data in the target regular volume is copied to the target subvolume, a first examination of whether the target subvolume is in an online state on the basis of the ON/OFF information on the target subvolume, and, when, as a result of this first examination, the target subvolume is known to be in an online state, the channel control unit performs a second examination with regard to which separate host device the target subvolume is connected to on the basis of path group information on the target subvolume.

All of the independent claims recite at least one of these features or this feature, if there is only one. In particular, independent claim 1 recites a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit, and online information indicating whether a logical volume in the disk array is online. Independent claim 12 recites control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an

online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded, and as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of volumes are paired and data in the target regular volume is copied to the target subvolume, a first examination of whether the target subvolume is in an online state on the basis of the ON/OFF information on the target subvolume, and, when, as a result of this first examination, the target subvolume is known to be in an online state, the channel control unit performs a second examination with regard to which separate host device the target subvolume is connected to on the basis of path group information on the target subvolume.

The references considered most closely related to the claimed invention are briefly discussed below:

The patent to Goodlander et al., U.S. Patent No. 5,257,367, discloses a disk drive access control apparatus for connection between a host computer and a plurality of disk drives to provide an asynchronously-operating storage system. A plurality of disk drive controller channels are connected to respective ones of the disk drives for controlling transfers of data to and from the disk drives. Each of the disk drive controller channels includes a cache/buffer memory and a micro-processor unit. An interface and driver unit interfaces with the host computer, and there is a central cache memory. Cache memory control logic controls

transfers of data from the cache/buffer memory of the plurality of disk drive controller channels to the cache memory, and from the cache memory to the cache/buffer memory of the plurality of disk drive controller channels, and also from the cache memory to the host computer through the interface and driver unit. A central processing unit manages the use of the cache memory by requesting data transfers only of data not presently in the cache memory, and by sending high level commands to the disk drive controller channels. A first (data) bus interconnects the plurality of disk drive cache/buffer memories, the interface and driver unit, and the cache memory for the transfer of information. A second (information and commands) bus interconnects the same elements with the central processing unit for the transfer of control and information. (See, e.g., Abstract and column 5, line 40, through column 6, line 26.) However, unlike the present invention, Goodlander et al. do not disclose a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit (claim 1), and/or online information indicating whether a logical volume in the disk array is online (claim 1), and/or control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded (claim 12), and/or a storage control subsystem wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of

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volumes are paired and data in the target regular volume is copied to the target

subvolume, a first examination of whether the target subvolume is in an online

state on the basis of the ON/OFF information on the target subvolume, and,

when, as a result of this first examination, the target subvolume is known to be in

an online state, the channel control unit performs a second examination with

regard to which separate host device the target subvolume is connected to on

the basis of path group information on the target subvolume (claim 12).

The patent to Glider et al., U.S. Patent No. 5,388,243, discloses a multi-

port storage unit in a network architecture system, which can have any or all of

its ports active at any time. There is provided a data processing system including

one main processing unit, one mass storage unit, a plurality of controllers for

controlling the one mass storage unit and interfacing between the one mass

storage unit and the one main processing unit, and a data communications bus

interconnecting the one main processing unit, the mass storage unit, and the

plurality of controllers in a network configuration. The mass storage unit has a

plurality of ports for communicating with the controllers, with two out of the

plurality of ports being capable of being active at any one time, and one each of

the two ports being connected to a different one of the plurality of controllers.

Therefore, a plurality of the one main processing unit can communicate with the

one mass storage unit via the network over a plurality of paths simultaneously,

and each mass storage unit can communicate with the one main processing unit

through the two paths. The system also includes a path state that indicates

whether the storage unit is online, unavailable, or offline. (See, e.g., Abstract and column 3, lines 25 - 51, and column 7, lines 32 - 48.) However, unlike the present invention, Glider et al. do not disclose a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit (claim 1), and/or online information indicating whether a logical volume in the disk array is online (claim 1), and/or control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded (claim 12), and/or a storage control subsystem wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of volumes are paired and data in the target regular volume is copied to the target subvolume, a first examination of whether the target subvolume is in an online state on the basis of the ON/OFF information on the target subvolume, and, when, as a result of this first examination, the target subvolume is known to be in an online state, the channel control unit performs a second examination with regard to which separate host device the target subvolume is connected to on the basis of path group information on the target subvolume (claim 12).

The patent to Kitamura et al., U.S. Patent No. 6,854,034, discloses a computer system that has a plurality of computers and a storage device

subsystem connected to the plurality of computers. The storage device subsystem, which has a plurality of storage devices and a plurality of interfaces, is connected to the computers. One of the computers has a management means for holding data about the storage devices within the storage device subsystem and about a connection relationship between the computers and storage device subsystem. Each computer, when attempting to form a new device, informs the management means of its capacity and type. The management means, when informed by the computer, selects one of the storage devices satisfying its request. The management means instructs the storage device subsystem to set necessary data in such a manner that the requesting computer can access the selected device. The management means also returns necessary data to the computer as a device assignment demander, such that the computer as the requester can modify its setting based on the data, and can use the assigned device. The system also has an online or offline indication that indicates the state of the logical devices, namely, whether or not they are allowed to be accessed by a host computer. (See, e.g., Abstract and column 2, lines 1 - 47, and column 4, line 61, through column 5, line 36.) However, unlike the present invention, Kitamura et al. do not disclose a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit (claim 1), and/or online information indicating whether a logical volume in the disk array is online (claim 1), and/or control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event

of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded (claim 12), and/or a storage control subsystem wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of volumes are paired and data in the target regular volume is copied to the target subvolume, a first examination of whether the target subvolume is in an online state on the basis of the ON/OFF information on the target subvolume, and, when, as a result of this first examination, the target subvolume is known to be in an online state, the channel control unit performs a second examination with regard to which separate host device the target subvolume is connected to on the basis of path group information on the target subvolume (claim 12).

The published patent application to Hino et al., U.S. Patent Application No. 2002/0184439, discloses a method and system for providing a storage control unit to be connected to a fiber channel. A new storage control unit is added onto the fiber channel network during on-line operation and succeeds control information of a logical unit from the storage control unit which has been existing before, so as to be in charge of a process request issued to that logical unit from a host computer. A control memory able to memorize the control information is provided in each of the storage control units. The control information is necessary when succeeding or taking over the logical unit, and is represented by a construction information of a magnetic disk drive within a disk drive unit and

construction information of the logical unit. The contents of the control memory within the storage control unit are copied into the control memory of the storage control unit when the new storage control unit is added onto the fiber channel network. A memory capacity and a number of blocks store the total memory capacity and the total block number of that magnetic disk drive, and also a RAID group number stores the number of the RAID groups to which that magnetic disk belongs. Further, a condition stores an information for indicating whether that magnetic disk drive is in an on-line condition under which it can be used, or in a blocking condition under which it cannot be used. Furthermore, a kind of memory device is used for identifying the memory device on the fiber channel network, i.e., the magnetic disk device, the optical disk device, the magnetic tape device, or various kinds of library devices. (See, e.g., Abstract and paragraphs 33-34, and paragraph 70.) However, unlike the present invention, Hino et al. do not disclose a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit (claim 1), and/or online information indicating whether a logical volume in the disk array is online (claim 1), and/or control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded (claim 12), and/or a storage control subsystem wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target

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subvolume among the plurality of volumes are paired and data in the target

regular volume is copied to the target subvolume, a first examination of whether

the target subvolume is in an online state on the basis of the ON/OFF information

on the target subvolume, and, when, as a result of this first examination, the

target subvolume is known to be in an online state, the channel control unit

performs a second examination with regard to which separate host device the

target subvolume is connected to on the basis of path group information on the

target subvolume (claim 12).

The published patent application to McBrearty et al., U.S. Patent

Application No.2003/0191917, discloses a method and apparatus for

synchronizing an offline mirror to a working copy. The method and apparatus

include synchronizing an offline mirror to a working mirror while allowing access

to data stored in the working mirror. A mirroring map is created that includes at

least two working mirrors and an offline mirror. When the offline mirror is to be

synchronized with one of the working mirrors, the two working mirrors are

disassociated from each other, making each one an independent storage

system. The offline mirror is then synchronized to one of the disassociated

mirrors. The working mirror that is not being used to synchronize the offline

mirror is used to provide access to stored data if needed. After the offline mirror

is synchronized, the two working mirrors are re-associated with each other.

(See, e.g., Abstract and paragraph 15.) However, unlike the present invention,

McBrearty et al. do not disclose a cache memory unit that temporarily stores data

that is sent and received to and from the channel control unit and the disk control

unit (claim 1), and/or online information indicating whether a logical volume in the

disk array is online (claim 1), and/or control memory in which, for each of the

plurality of logical volumes, volume discrimination information, ON/OFF

information indicating whether an online state exists, and, in the event of an

online state, path group information with regard to which host device(s) the

subvolume is connected to, are recorded (claim 12), and/or a storage control

subsystem wherein as a result of receiving a specific command from a certain

host device, the channel control unit performs, before a target regular volume

and target subvolume among the plurality of volumes are paired and data in the

target regular volume is copied to the target subvolume, a first examination of

whether the target subvolume is in an online state on the basis of the ON/OFF

information on the target subvolume, and, when, as a result of this first

examination, the target subvolume is known to be in an online state, the channel

control unit performs a second examination with regard to which separate host

device the target subvolume is connected to on the basis of path group

information on the target subvolume (claim 12).

The published patent application to Vishlitzky et al., U.S. Patent

Application No.2003/0196056, discloses a system and method for establishing a

plurality of storage areas that include associating each of a first plurality of

storage areas of a first type that contain sections of data with corresponding ones

of a second plurality of storage areas of a second type having pointers to

alternative sections of data storage areas of the first type. Initially, none of the second plurality of storage areas is available for accessing data. After associating all of the first and second plurality of storage areas, the second plurality of storage areas are activated to make the second plurality of storage areas available for accessing data. Exclusive access may be enabled for all of the first plurality of storage areas prior to activating the second plurality of storage areas, or to each storage area one at a time. The system also includes online/offline indicators that indicate whether a newly-established virtual device is online or offline. (See, e.g., Abstract and paragraphs 8 and 201.) However, unlike the present invention, Vishlitzky et al. do not disclose a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit (claim 1), and/or online information indicating whether a logical volume in the disk array is online (claim 1), and/or control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded (claim 12), and/or a storage control subsystem wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of volumes are paired and data in the target regular volume is copied to the target subvolume, a first examination of whether the target subvolume is in an online state on the basis of the ON/OFF information on the target subvolume, and,

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when, as a result of this first examination, the target subvolume is known to be in an online state, the channel control unit performs a second examination with regard to which separate host device the target subvolume is connected to on the basis of path group information on the target subvolume (claim 12).

The published patent application to Patel et al., U.S. Patent Application No.2004/0148479, discloses a system and method for transferring data from a source storage unit, where storage units are configured within a storage system. A data transfer operation is processed to transfer data from source storage blocks in a source storage unit to corresponding target storage blocks in a target storage unit. For each source storage block, before transferring data from one source storage block to the corresponding target storage block, indication is made that the source storage block is in a locked state. Data in the source storage block in the locked state is not accessible to a host data request, and data in the storage blocks that are not in the locked state are accessible to a host data request while the data transfer operation is pending. Indication is further made that the source storage block is not in the locked state after transferring the data in the source storage block to the corresponding target storage block. (See, e.g., Abstract and paragraphs 8 - 12.) However, unlike the present invention, Patel et al. do not disclose a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit (claim 1), and/or online information indicating whether a logical volume in the disk array is online (claim 1), and/or control memory in which, for each of the plurality

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of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded (claim 12), and/or a storage control subsystem wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of volumes are paired and data in the target regular volume is copied to the target subvolume, a first examination of whether the target subvolume is in an online state on the basis of the ON/OFF information on the target subvolume, and, when, as a result of this first examination, the target subvolume is known to be in an online state, the channel control unit performs a second examination with regard to which separate host device the target subvolume is connected to on the basis of path group information on the target subvolume (claim 12).

Therefore, since the references fail to disclose a cache memory unit that temporarily stores data that is sent and received to and from the channel control unit and the disk control unit, and/or online information indicating whether a logical volume in the disk array is online, and/or control memory in which, for each of the plurality of logical volumes, volume discrimination information, ON/OFF information indicating whether an online state exists, and, in the event of an online state, path group information with regard to which host device(s) the subvolume is connected to, are recorded, and/or a storage control subsystem

wherein as a result of receiving a specific command from a certain host device, the channel control unit performs, before a target regular volume and target subvolume among the plurality of volumes are paired and data in the target regular volume is copied to the target subvolume, a first examination of whether the target subvolume is in an online state on the basis of the ON/OFF information on the target subvolume, and, when, as a result of this first examination, the target subvolume is known to be in an online state, the channel control unit performs a second examination with regard to which separate host device the target subvolume is connected to on the basis of path group information on the target subvolume, it is submitted that all of the claims are patentable over the cited references.

CONCLUSION

Applicant has conducted what it believes to be a reasonable search, but makes no representation that "better" or more relevant prior art does not exist. The Patent Office is urged to conduct its own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited herein and any other prior art that the Patent Office may locate in its own independent search. Further, while Applicant has identified in good faith certain portions of each of the references listed herein in order to provide the requisite detailed discussion of how the claimed subject matter is patentable over the references, the Patent Office should not limit its review to the identified portions but rather, is urged to review and consider the entirety of each reference, and not to rely solely on the identified portions when examining this application.

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In view of the foregoing, Applicant requests that this Petition to Make Special be granted and that the application undergo the accelerated examination procedure set forth in MPEP 708.02 VIII.

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
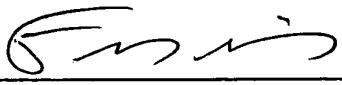
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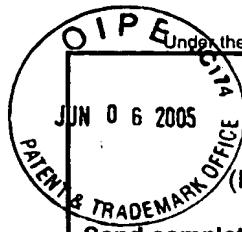
PETITION FEE
Under 37 CFR 1.17(f), (g) & (h)
TRANSMITTAL
(Fees are subject to annual revision)

**Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450**

Application Number	10/795,997
Filing Date	March 10, 2004
First Named Inventor	Kunihiko NASHIMOTO et al.
Art Unit	2188
Examiner Name	M. Padmanabhan
Attorney Docket Number	1309.43634X00

Enclosed is a petition filed under 37 CFR 1.102(d) that requires a processing fee (37 CFR 1.17(f), (g), or (h)). Payment of $ 130.00 is enclosed.

This form should be included with the above-mentioned petition and faxed or mailed to the Office using the appropriate Mail Stop (e.g., Mail Stop Petition), if applicable. For transmittal of processing fees under 37 CFR 1.17(i), see form PTO/SB/17i.

Payment of Fees (small entity amounts are NOT available for the petition (fees) .

☒ The Commissioner is hereby authorized to charge the following fees to Deposit Account No. <u>50-1417:</u>

☐ petition fee under 37 CFR 1.17(f), (g) or (h)   ☒ any deficiency of fees and credit of any overpayments
Enclose a duplicative copy of this form for fee processing.

☐ Check in the amount of $ _____ is enclosed.

☒ Payment by credit card (From PTO-2038 or equivalent enclosed). Do not provide credit card information on this form.

Petition Fees under 37 CFR 1.17(f):   **Fee $400**   **Fee Code 1462**
For petitions filed under:
§ 1.53(e) - to accord a filing date.
§ 1.57(a) - to according a filing date.
§ 1.182 – for decision on a question not specifically provided for.
§ 1.183 – to suspend the rules.
§ 1.378(e) for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.
§ 1.741(b) – to accord a filing date to an application under §1.740 for extension of a patent term.

Petition Fees under 37 CFR 1.17(g):   **Fee $200**   **Fee code 1463**
For petitions filed under:
§1.12 - for access to an assignment record.
§1.14 - for access to an application.
§1.47 - for filing by other than all the inventors or a person not the inventor.
§1.59 - for expungement of information.
§1.103(a) - to suspend action in an application.
§1.136(b) - for review of a request for extension of time when the provisions of section 1.136(a) are not available.
§1.295 - for review of refusal to publish a statutory invention registration.
§1.296 - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.
§1.377 – for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.
§1.550(c) – for patent owner requests for extension of time in <u>ex parte</u> reexamination proceedings.
§1.956 – for patent owner requests for extension of time in <u>inter partes</u> reexamination proceedings.
§ 5.12 – for expedited handling of a foreign filing license.
§ 5.15 – for changing the scope of a license.
§ 5.25 – for retroactive license.

Petition Fees under 37 CFR 1.17(h):   **Fee $130**   **Fee Code 1464**
For petitions filed under:
§1.19(g) – to request documents in a form other than that provided in this part.
§1.84 – for accepting color drawings or photographs.
§1.91 – for entry of a model or exhibit.
§1.102(d) – to make an application special.
§1.138(c) – to expressly abandon an application to avoid publication.
§1.313 – to withdraw an application from issue.
§1.314 – to defer issuance of a patent.

Name (Print/Type)	**Frederick D. Bailey**	*Registration No. (Attorney/Agent)*	**42,282**
Signature		*Date*	June 6, 2005